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VIRGINIA MINING 1995: AN ELEVEN AND ONE-HALF BILLION DOLLAR INDUSTRY

The Commonwealth of Virginia is not normally considered by its citizens as being a state with a large mining industry or one that has a large mining impact on the nation. This article will enlighten those who are not aware of the economic implications of mining to the Commonwealth. In 1995, there were 85 counties and six independent cities that contained mining, mineral extraction or mineral processing within their political boundaries (Figure 1). In the simplest terms, "mining" of rock and/or mineral resources creates value by converting the mineral resources into a product(s) that are used by society. The product(s) produced has a direct impact on society's standard of living. In general, in its initial state, these "raw" unmined resources have little or no value until a product is created.

A comprehensive study of the mining industry in the United States was initiated by the National Mining Association to determine the economic value of mining to the nation[1]. The study is very comprehensive regarding the "hard" mining industries and does not include any aspect of the oil and gas industry. The report includes the various mining industries that are broken into four areas—construction materials (crushed stone, dimension stone, sand and gravel, cement, gypsum, perlite, and structural clays (common clay); coal mining; industrial minerals mining that are for use in manufacturing and agriculture (lime, kaolin, salt, phosphate rock, soda ash, industrial sand, borates, potash, ilmenite and rutile, fuller's earth, talc, bentonite, bromine, diatomite, sulfur, rare earths, magnesium compounds, and other industrial minerals); and metal mining (ferrous and precious metals; copper, lead and zinc; light metals—ores of beryllium, magnesium, titanium, silicon).

Dr. Leaming's study is based on the direct output of the mining industry in 1995. The American mining industry had a direct and indirect impact on the economy of the United States in 1995 of almost 524 billion dollars. This total economic benefit was almost nine times the value of the solid minerals that were mined in the United States that year. Almost five million Americans had jobs in 1995 as a result of the combined direct and indirect contributions of the mining industry to personal, business, and government income throughout the nation. The number of jobs created was more than 15 times the number of workers directly involved in mining.

What does Mining mean to Virginia?

The 1995 data and the resultant analysis show that Virginia had a combined total direct and indirect eco-

[1]This issue of *Virginia Minerals* is almost totally taken from the study by Dr. George F. Leaming of the Western Economic Analysis Center, Marana, Arizona, starting with methodology used in the national study. The study was commissioned by the National Mining Association. In the reproduction of the overall summary, "Mining and the American Economy", there has been very minor rewording. Copies of the extensive study can be obtained from the National Mining Association; 1130 17th Street, N.W., Washington, D.C. 20036-4677.

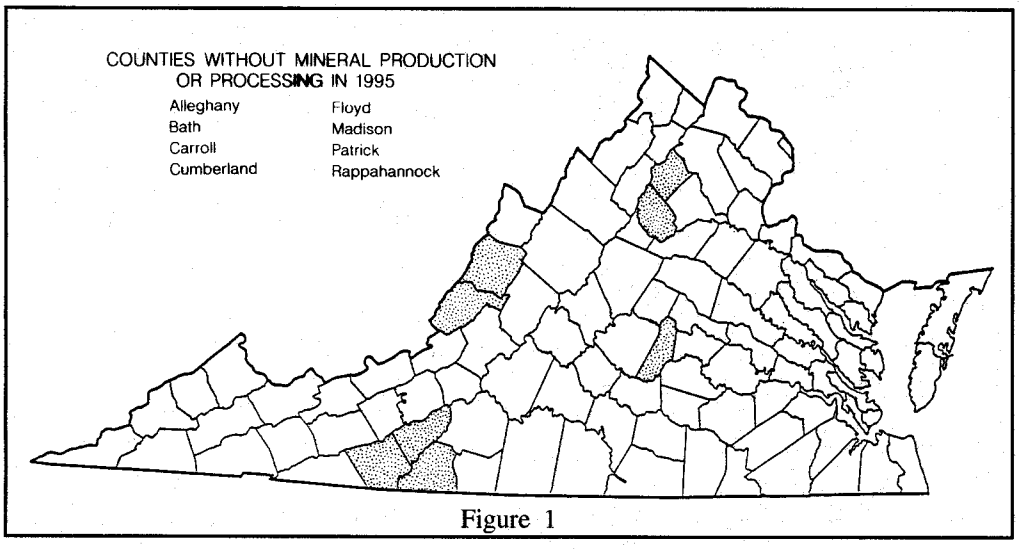

Figure 1

nomic benefit of $11,498,840,000; total jobs gained, both directly and indirectly of 124,800; with direct jobs gained of 10,900 (Table 1). Overall, Virginia ranked 17th in the direct and indirect impact of the nation's mining industry (Figure 2); 18th in the direct impact ($1,019,016,000) (Figure 3); and 14th in the total employment supported directly and indirectly (124,800) (Figure 4). Figure 5 shows Virginia's direct contributions to the federal revenue (14th). Table 1 shows the total impacts of mining on the economy of Virginia in 1995.

The following tables and graphs show the status of where Virginia ranks in each of the four "breakdown" categories previously mentioned. In the production of coal, Virginia ranked 9th in the direct impact (Figure 6) and 13th in the combined impact (Figure 7). Overall, the impact to Virginia from the mining of coal was $4,708,619,000 in 1995 (Table 2). The mining of construction minerals had an overall impact of $3,355,344,000 in 1995 (Table 3). In this category, Virginia ranks 14th in direct impacts (Figure 8), 16th in value (Figure 9), and 13th in total employment (36,940 individuals) (Figure 10). Although, not ranking in the top 20 in production of industrial minerals used in manufacturing and agriculture, Virginia had a combined direct and indirect gain of $1,327,641,000 (Table 4) and had a total of 14,900 jobs associated in this area (Table 4; Figure 11) (14th in ranking). It is interesting to note that although there were no metals mined in Virginia in 1995, the combined direct and indirect gain was $2,211,740,000 and was responsible for 24,300 jobs (Table 5). This is an excellent example that indicates that the state or individuals do not have to have a direct gain due to mining in the state in order to benefit from the mining taking place in other states. The indirect gains to Virginia from mining in other states comes from the processing of materials, equipment produced, etc.

The rock, mineral, and related materials mined in Virginia in 1995 were: coal, shale, clay, sand, gravel, limestone, dolostone, sandstone, quartzite, granite, gneiss, diabase, greenstone, basalt, slate, marble, feldspar, soapstone, gypsum, industrial sand, vermiculite, kyanite, iron-oxide, and gemstones. In addition to those resources mined in Virginia, several were brought into Virginia for processing — lithium, manganese, mica, perlite, and phosphate rock; and crude petroleum from which by-product sulfur was produced.

METHODOLOGY USED IN THE NATIONAL STUDY

Direct Economic Impact

The direct impact of any economic activity on any local, state, or national economy can be measured in terms of that activity's direct contributions to: (1) the personal income of the residents of that affected area; (2) the sales of other businesses operating in the affected area; and (3) the revenues of those governments with jurisdiction completely within the affected area.

Where the economic activity being examined is an extractive industry, such as mining, then that industry's direct contributions to the local, state, or national economy's personal income consists of the payments by the industry's member firms of wages and salaries and other cash benefits, such as pensions, to employees and former employees who are residents of the affected locality, state, or nation. The direct contributions to the incomes of other businesses include the purchases by the industry's member firms of equipment, materials, energy, and services from other business firms in the affected area. The direct contributions to local, state, and federal government revenues include all taxes, fees, and other payments to the relevant governments by the industry's member firms.

In analyzing the economic impact of the mining indus-

try of the United States, data on direct personal income, business sales, and government payments were secured from both published sources and from a limited survey of firms that were involved in the production of solid minerals in the United States in 1995. Using an industry-specific spreadsheet, data on personal income payments, purchases, and payments to governments, as well as data on production and employment, from survey responses, annual reports, industry associations, state agencies, and the United States Geological Survey were entered and totaled. Sample totals were extrapolated to industry and state totals on the basis of production and employment ratios.

Indirect Economic Impacts

Direct income flows, such as payrolls, pensions, purchases, and taxes, circulate and recirculate within local, state, and national economies. That circulation and recirculation creates additional indirect income for the residents, businesses, and governments in those areas. Such indirect incomes usually affect not only those households, business firms, and government units that received direct payments from the industry being studied, but also many who do not receive any such direct payments. The amount of such indirect income must be considered in evaluating the full economic impact of any industry, particularly any extractive industry, on any local, state, or national economy.

For example, the wages and salaries paid by mining firms to their employees are used by those employees to buy food, clothing, housing, energy, automobiles, services, and a variety of other consumer goods from local, state, and national businesses, as well as from firms outside of the United States. Those firms then pay their employees, creating more personal income that is an indirect consequence of the direct payrolls of the mining enterprise. Those employees of those businesses then make similar purchases of products and services from local, state, or national businesses, creating even more indirect business income. Such payments made to entities outside of the relevant locality, state, or nation represent leakages or out-flows from the economy and serve to diminish the amount of indirect income created internally from a given amount of direct income.

Similarly, the taxes paid to local, state, and federal government units are used to pay teachers, law enforcement personnel, and other government workers, who in turn buy food, clothing, housing, and other consumer products and services. They also pay additional local, state, and federal taxes.

As the circulation and recirculation of direct income takes place, it multiplies the total impact of the industry's direct payments for payrolls, pensions, purchases, and taxes. Following this flow of income through the local, state, or national economy by means of an impact dispersion network allows the computation of appropriate income multipliers for each of the three (four, when federal revenues are separated from state and local government revenues) general types of income. The application of those income multipliers to the direct incomes yields an estimate of the indirect income generated as a result of the direct income contributions to the economy.

In analyzing the indirect impacts of the mining industry on the economy of the United States, the indirect incomes resulting from the circulation and multiplication of the direct income impacts were calculated using the appropriate income multipliers for the mining industry as a whole. These calculations involved use of a four-sector combined impact matrix derived from four separate impact dispersion networks, i.e. one each for personal income, business income, state and local government revenues, and federal government revenues.

Combined Economic Impact

The combined economic impact of any extractive industry, such as mining, on a local, state, or national economy is calculated as the simple arithmetic sum of the direct and indirect impacts. It is always larger than the direct impact alone. Where the local, state, or national economy is large and diverse (as in California and the United States) the income leakages tend to be small and the combined economic impact of a single industry is frequently much larger than the direct impact alone. Where the local or state economy is not large or diverse, however, then the income leakages tend to be larger and the combined direct and indirect impact of the industry is not so large. Nevertheless, even under such conditions, the combined direct and indirect impact is usually significantly greater than the direct impact alone.

DIRECT ECONOMIC IMPACTS OF MINING TO THE UNITED STATES IN 1995

As a Source of Jobs and Personal Income

The nation's producers of solid minerals directly provided 320,400 jobs and more than $14.5 billion in personal income for Americans in 1995. Of that total personal income of over $14.5 billion, about 85 percent, about $12.3 billion, were paid as wages and salaries directly to industry workers. Another $700 million were

paid as pensions to retired employees. In addition, almost $1.5 billion were paid as dividends to industry stockholders.

As a Source of Business Sales

Purchases from other businesses that were made by firms involved in the production of solid minerals in 1995 amounted to more than $27 billion. Of that total, more than half (55 percent) was spent with suppliers of products and services located in the states where mining and processing operations were located. Less than half went to suppliers in other states. Even though all of the 50 states were involved to a greater or lesser extent in the mining industry, there was a considerable amount of interstate trade in products and services supplied to the nation's mining industry.

The biggest share of the purchases made by solid minerals producers in 1995 went to wholesale firms that supplied those producers with equipment and parts, the fuel to run that equipment, and the hardware and many other industrial products needed to mine and process minerals. The manufacturers of those products likewise shared in the business income provided directly by the mining industry. The second biggest share of industry spending, however, went to electric, gas, and water utilities that sold energy and services directly to mining enterprises.

Other industries also received significant sales revenues from mining firms in return for the products they provided and the services the rendered. Among the service industries, a significant portion of the spending by mineral producers went to the health care industry, while the legal and engineering professions, as well as firms providing specialized business and repair services also shared in sales to mining firms.

Contract construction firms also received sales revenues from the mining industry. Such revenues were limited in 1995, however, since only a few segments of the mining industry were expanding productive capacity by any significant amount. Finance, insurance, and real estate firms also shared slightly in the spending by solid minerals producers in 1995.

Truck, rail, water, and air transportation firms got substantial amounts of sales revenues from the mining industry for hauling materials and supplies to mining and processing operations and for taking finished products to users. Much of the transportation industry's direct benefit from hauling mine products, however, came not directly from mineral producers, but from the manufacturing firms and public utilities that were the major buyers of mine output. Retail merchants received comparatively small amounts of sales revenues directly from mining firms. Mining firms also did relatively little business with each other, with most intra-industry trade limited to the purchase of construction materials and some other industrial minerals by metal mining and coal mining firms.

As a Source of State and Local Government Revenues

State and local governments in the states in which mining activities were located received a total of almost $3.4 billion in revenues directly from the mining industry in 1995. That total direct support of state, county, municipal, school district, and other local governments was paid in the form of corporate income taxes, property taxes, production taxes, payroll taxes, sales taxes on purchases, rents and royalties for the use of state-owned lands, and a variety of other taxes and fees.

As a Source of Federal Revenues

The federal government received slightly more revenue directly from the producers of solid minerals than did the various state and local governments in 1995. Payments of mostly corporate income taxes, payroll taxes, and mineral lease payments directly to the federal government by mining firms in 1995 amounted to over $3.5 billion. More than half (52 percent) of that total was paid in the form of corporate income taxes. More than a fourth (28 percent) went mostly in employers' payroll taxes to finance the national's social security and Medicare systems. About a fifth went to the federal government in the form of non-tax payments, including royalties for minerals mined from federal lands.

Total Direct Contributions to the National Economy

The total direct contribution made by mining firms in 1995 amounted to more than $48.4 billion. Of that total, the biggest share (56 percent) was paid directly to other business firms. The second largest share (30 percent) was paid as personal income to employees, former employees, and stockholders. Federal, state, and local governments shared in the remaining 14 percent of the mining industry's direct contribution to the national economy.

The direct economic impacts of the mining industry varied, of course, from one state to another. The largest impacts generally were felt in states such as West Virginia, Kentucky, Arizona, and Nevada where mining ac-

tivity was the greatest and, consequently, the payment of payrolls and purchases from public utilities and other local businesses were the highest.

Direct economic impacts were also relatively high in those states that produced large amounts of mining equipment and industrial supplies both for internal use and for export to other states. Thus, the direct economic impact of mining was relatively high in states such as Michigan and New York where industrial equipment and supplies were produced for use in many states. The direct economic impact of mining was high in states such as California, Pennsylvania, and Texas, because they not only had large internal mining industries but also produced supplies for use in other states.

INDIRECT ECONOMIC IMPACTS

Incomes Multipliers

The mining industry creates wealth by taking a natural resource found in the earth's crust, removing it from its natural setting, and converting it into a product useful to mankind. Mining literally takes a part of nature that has no or very little economic value and creates something of economic value from it. The value of the output of mining, therefore, is created value. The payments by which the mining industry disburses that created value to others form a net addition to the stream of income in the economy.

Some mineral deposits, of course, have nominal monetary value before any mining takes place. Thus, mineral deposits are bought and sold and leased. Such monetary market values, however, derive primarily from the expectations of buyers, sellers, lessors, or lessees that mining will take place at some time in the future and that enough finished mineral output will be extracted to cover not only the costs of production but also the cost of buying or leasing the mineral deposit.

The land surface above a mineral deposit may have some value as real estate for some use other than mining. Although the initial surface may be disturbed by mining activity, after mining is finished the surface remains, perhaps at a somewhat lower elevation than before mining. The after mining surface, in fact, may be more or less valuable as real estate than it was before mining. Nevertheless, as a result of the generally neutral effects of mining on surface land values, the output of mining constitutes a net creation of value that can be measured in monetary terms based on the market value of the mine output.

That new economic value created each year by mining is then converted to a stream of income payments that flows into the national economy through the factor payments that each mining enterprise makes. From the sales of its product, each mining enterprise (and thereby, the industry as a whole) makes payments to its factors of production, that is, to its employees (in the form of wages and salaries), former employees (in the form of pensions or other benefits), investors (in the form of dividends), suppliers (in the form of purchases of products and services used in mining), and to federal, state, and local governments (in the form of taxes and fees). Each stream of such payments from the mining industry in turn becomes a stream of income for the particular sector (household, business, or government) receiving it.

The streams of initial factor payments from the mining industry to households, businesses, and governments comprise a monetary measure of the direct impact of mining on the economy. Those incomes that are injected into the economy directly by mining enterprises, however, do not cease with their initial recipients. The money received directly by the mining industry's employees, former employees, stockholders, and suppliers, and by local, state, and federal government units are in turn spent by those recipients to produce additional personal, business, and government incomes for others. Those others, in turn, spend the incomes they receive, creating even more income.

That subsequent spending by those who receive direct income payments from the mining industry creates a flow of indirect personal, business, and government income that must be included in any assessment of the full economic impact of the mining industry on the nation's economy. Eventually, the income created initially by the mining industry is dissipated by leakages or outflows to the rest of the world, but its circulation and recirculation within the nation's economy before being so dissipated creates a multiplier or ripple effect that can be calculated and used to estimate the indirect incomes provided by mining in any year.

Indirect Jobs and Personal Income

In 1995, the multiplier or ripple effect created by the circulation and recirculation of the direct incomes injected into the economy of the United States by the mining of solid minerals expanded the initial direct personal income impact of about $14.5 billion to over $143.7 billion. That was enough to expand the 320,400 jobs provided directly by mining by more than 4.6 million indirect jobs. That represented an indirect increase in the number of jobs provided by producing solid minerals

that was over 14 times the number provided directly by mining.

Indirect Sales for Other Businesses

The sales of non-mining businesses created indirectly by the circulation and recirculation of direct incomes injected into the economy of the United States by the mining of solid minerals in 1995 amounted to almost $269 billion. That was more than 10 times the business income generated directly by mining and more than four times the total value of solid minerals produced.

Indirect State and Local Government Revenues

The revenues received by state and local governments throughout the United States indirectly as a result of the circulation and recirculation of payments of taxes and fees paid directly by mining firms totaled almost $23.8 billion in 1995. That was more than seven times the amount of such taxes and fees paid directly by minerals producers. Significant amounts of that indirect government revenue were accumulated in states that were not major sources of minerals.

Indirect Federal Government Revenues

The revenues received indirectly by the federal government as a result of the circulation of direct income payments made by mining firms in 1995 exceeded $53 billion. That was more than 15 times the amount of federal income and payroll taxes paid directly by mining firms.

Total Indirect Contributions to the National Economy

In 1995, the multiplier or ripple effect created by the circulation of the direct incomes injected into the economy of the United States by the mining industry expanded that direct impact of about $48 billion by nearly $475 billion. That represented an effective indirect/direct income multiplier for the industry of about ten. The multipliers for the individual states were much less.

COMBINED DIRECT AND INDIRECT IMPACTS

Combined Impact on Jobs and Personal Income

The people of the United States gained substantial amounts of personal income both directly and indirectly as a result of domestic mining activity in 1995. Nearly five million workers and their families benefited from mining to the tune of almost $144 billion of personal income. Not all of that amount went to those currently employed, however, as significant amounts were paid to mining company and other pensioners and recipients of social security benefits.

Combined Impact on Business Income

The greatest total gain from mining in the United States in 1995 was realized by the nation's businesses. The country's business firms received a total of more than $295 billion in sales directly and indirectly as a result of the mining of solid minerals in the United States. That does not include the sales of mining firms themselves.

Combined Impact on State and Local Government Revenues

State governments, as well as county, municipal, school district, and other local governments throughout the United States likewise shared in the economic gain generated directly and indirectly by the mining industry in 1995. More than $27 billion of the revenues received by state and local governments in the 50 United States and the District of Columbia were provided either directly or indirectly by the mining industry.

Combined Impact on Federal Government Revenues

The federal government gained much more from the nation's mining industry in 1995 than did state and local governments. Almost $57 billion of the revenues collected by the federal government in 1995 were provided either directly or indirectly by the mining industry.

Total Combined Economic Impact

The economy of the United States thus gained more than $523 billion in 1995 as a combined direct and indirect result of the domestic mining of solid minerals. That over half a trillion dollars of economic benefit includes the direct and indirect contributions of mining to personal, business, and government incomes throughout the nation.

Additional Indirect Economic Impacts

Coal. In addition to the general impacts, coal also has an impact as measured by energy flows.

As Measured by Energy Flows

The mining of coal does more, of course, than provide money for mining industry employees, former or retired employees, stockholders, suppliers, and govern-

ments. Coal mining's primary function is to provide a fuel that can readily be converted to energy, mostly electrical energy. In doing so, the coal mining industry has an even greater impact on the nation's economy than in its role as a creator and disburser of monetary value. The industry's most important economic role in 1995 was not as a source of money provided as it created a useful fuel, but as a source of the vital energy used in the nation's factories, stores, and offices and without which much of the business and government activity in the United States would not have taken place.

Most of the coal mined in the United States in 1995 served as fuel in generating electric power. The electricity that was generated using coal was distributed to and used by firms in the communications, manufacturing, wholesale trade, retail trade, finance, insurance, and real estate, and other service industries as well as by federal, state, and local government entities. Those activities involved more than 56 million workers who received more than $1.2 trillion in personal income for their efforts. In addition, those activities added substantially to business sales and government revenues, all of which were dependent upon electrical energy derived from domestically mined coal.

Industrial Minerals for Manufacturing and Agriculture

As measured by materials flows, the mining of industrial minerals for manufacturing and agriculture does more, of course, than provide money for mining industry employees, former or retired employees, stockholders, suppliers, and governments. Virtually by definition, its primary function is to provide tangible physical products for use by the nation's manufacturing and farming industries. In doing so, the mining industry has an even greater impact on the nation's economy than in its role as a creator and disburser of monetary value. The industry's most important economic role was not as a source of money provided as it created useful mineral products, but as a source of those vital mineral products used in the nation's factories and farms and without which much of that activity in the United States would not have taken place.

The industrial minerals mined and processed in the United States in 1995 served as raw materials for manufacturing firms, particularly makers of glass, pottery, industrial inorganic chemicals, paints, abrasives, agricultural chemicals, and other mineral products. In addition, many of the industrial minerals and the products made from them, including fertilizers and soil conditioners as well as some pesticides, were used by the nation's farmers to grow crops, creating an added indirect impact of the industrial minerals mining industry on the nation.

Industrial Minerals for Construction

As measured by materials flows, the mining of industrial minerals for construction does more, of course, than provide money for mining industry employees, former or retired employees, stockholders, suppliers, and governments. Virtually by definition, its primary function is to provide tangible physical products for use by the nation's construction industry. In doing so, the mining industry has an even greater impact on the nation's economy than in its role as a creator and dis-burser of monetary value. The industry's most important economic role was not as a source of money provided as it created useful mineral products, but as a source of those vital mineral products used in the nation's construction industry and without which much of the new construction in the United States would not have taken place.

The construction minerals mined and processed in the United States in 1995 served as raw materials for manufacturing firms, particularly makers of ready-mix concrete and concrete products such as concrete block and concrete pipe as well as bricks and other structural mineral products. The production of cement, gypsum wallboard, and clay bricks have been included as a part of the construction minerals industry itself, because the making of such products is almost everywhere tightly integrated with the mining of the mineral raw materials used in making such products. Many of the construction minerals and the products made from them, including cement and gypsum wallboard, were distributed to business and household users by wholesale and retail trade firms. Those distributing firms added to the indirect economic impact created by the construction minerals mining industry.

Construction minerals and mineral products were used in actual construction, with concrete alone forming the literal foundation of the much of the nation's construction industry. American contract construction firms, specifically general contractors,

heavy construction contractors, and masonry subcontractors all used minerals and mineral products made from minerals mined in the United States, thereby adding even more to the indirect economic impact of the construction minerals industry.

A significant portion of the firms in the nation's finance, insurance, and real estate industry also derived their incomes in 1995 from the new construction that was dependent upon domestically mined construction minerals. In addition, a significant number of business firms in the nation's services sector, namely those involved in construction equipment rental and in providing certain architectural and engineering services, also derived their incomes in 1995 from minerals-dependent new construction.

THE IMPACTS OF MINING ON THE ECONOMY OF VIRGINIA 1995

Value of minerals mined in Virginia	$1,454,759,000
Direct contribution to federal government revenues	$102,844,000
Virginia's Direct Economic Gain from Mining	$1,019,016,000
including:	
Personal Income gain of	$488,169,000
Business Income gain in-state of	208,600,000
Business Income gain from other states of	233,404,000
State and Local Government Revenue gain of	88,843,000
The Indirect Gain from Direct Gains	$3,362,214,000
including:	
Personal Income gain of	$655,078,000
Business Income gain of	2,570,037,000
State and Local Government Revenue gain of	137,099,000
and	
Virginia's Indirect Gain from Interstate Income Flows	$7,117,610,000
including:	
Personal Income gain of	$2,460,709,000
Business Income gain of	2,743,897,000
State and Local Government Revenue gain of	383,826,000
Federal Government Funds gain of	1,529,178,000
Virginia's Combined Direct and Indirect Gain	**$11,498,840,000**
including:	
Personal Income gain of	$3,603,956,000
Business Income gain of	5,755,938,000
State and Local Government Revenue gain of	609,768,000
Federal Government Funds gain of	1,529,178,000
Total Virginia Jobs Gained, directly and indirectly	124,800
Virginia Jobs Gained, directly	10,900

Source: Western Economic Analysis Center

Table 1

THE IMPACTS OF COAL MINING ON THE ECONOMY OF VIRGINIA 1995

Value of coal mined in Virginia	$970,799,000
Direct contribution to federal government revenues	$65,999,000
Direct Economic Gain from Coal Mining	$546,326,000
including:	
Personal Income gain of	$328,787,000
Business Income gain in-state of	103,552,000
Business Income gain from other states of	58,975,000
State and Local Government Revenue gain of	55,012,000
Indirect Gain from Direct Gains	$1,793,803,000
including:	
Personal Income gain of	$340,370,000
Business Income gain of	1,378,438,000
State and Local Government Revenue gain of	74,995,000
and	
Indirect Gain from Interstate Income Flows	$2,368,490,000
including:	
Personal Income gain of	$803,291,000
Business Income gain of	947,448,000
State and Local Government Revenue gain of	124,391,000
Federal Government Funds gain of	493,360,000
Combined Direct and Indirect Gain	**$4,708,619,000**
including:	
Personal Income gain of	$1,472,448,000
Business Income gain of	2,488,413,000
State and Local Government Revenue gain of	254,398,000
Federal Government Funds gain of	493,360,000
Total Jobs Gained, directly and indirectly	48,800
Jobs Gained, directly	6,900

Source: Western Economic Analysis Center

Table 2

THE IMPACTS ON THE ECONOMY OF VIRGINIA OF MINING INDUSTRIAL MINERALS FOR USE IN CONSTRUCTION 1995

Value of construction minerals mined in Virginia	$385,225,000
Direct contributions to federal government revenues	$27,005,000
Direct Economic Gain from Construction Minerals Mining	$305,792,000
including:	
Personal Income gain of	$117,485,000
Business Income gain in-state of	99,624,000
Business Income gain from other states of	60,447,000
State and Local Government Revenue gain of	28,236,000
Indirect Gain from Direct Gains	$1,011,616,000
including:	
Personal Income gain of	$201,800,000
Business Income gain of	769,440,000
State and Local Government Revenue gain of	40,376,000
and	
Indirect Gain from Interstate Income Flows	$2,037,936,000
including:	
Personal Income gain of	$715,310,000
Business Income gain of	754,501,000
State and Local Government Revenue gain of	112,744,000
Federal Government Funds gain of	455,381,000
Combined Direct and Indirect Gain	**$3,355,344,000**
including:	
Personal Income gain of	$1,034,596,000
Business Income gain of	1,684,012,000
State and Local Government Revenue gain of	181,355,000
Federal Government Funds gain of	455,381,000
Total Jobs Gained, directly and indirectly	36,900
Jobs Gained, directly	3,400

Source: Western Economic Analysis Center

Table 3

THE IMPACTS ON THE ECONOMY OF VIRGINIA OF MINING INDUSTRIAL MINERALS FOR USE IN MANUFACTURING AND AGRICUTURE 1995

Value of industrial minerals mined in Virginia	$98,735,000
Direct Economic Gain from Industrial Minerals Mining	$91,645,000
including:	
Personal Income gain of	$30,792,000
Business Income gain in-state of	10,532,000
Business Income gain from other states of	44,726,000
State and Local Government Revenue gain of	5,595,000
Indirect Gain from Direct Gains	$304,327,000
including:	
Personal Income gain of	$60,927,000
Business Income gain of	231,337,000
State and Local Government Revenue gain of	12,063,000
and	
Indirect Gain from Interstate Income Flows	$931,669,000
including:	
Personal Income gain of	$327,717,000
Business Income gain of	349,214,000
State and Local Government Revenue gain of	50,532,000
Federal Government Funds gain of	204,206,000
Combined Direct and Indirect Gain	**$1,327,641,000**
including:	
Personal Income gain of	$419,436,000
Business Income gain of	635,809,000
State and Local Government Revenue gain of	68,190,000
Federal Government Funds gain of	204,206,000
Total Jobs Gained, directly and indirectly	14,900
Jobs Gained, directly	600

Source: Western Economic Analysis Center

Table 4

THE IMPACTS OF METAL MINING ON THE ECONOMY OF VIRGINIA 1995

Value of metals mined in Virginia	$0
Direct contribution to federal government revenues	$0
Virginia's Direct Economic Gain from Metal Mining	$82,382,000
including:	
Personal Income gain of	$11,105,000
Business Income gain in-state of	0
Business Income gain from other states of	71,277,000
State and Local Government Revenue gain of	0
The Indirect Gain from Direct Gains	$276,498,000
including:	
Personal Income gain of	$57,089,000
Business Income gain of	208,854,000
State and Local Government Revenue gain of	10,555,000
and	
Virginia's Indirect Gain from Interstate Income Flows	$1,852,860,000
including:	
Personal Income gain of	$606,817,000
Business Income gain of	763,352,000
State and Local Government Revenue gain of	98,993,000
Federal Government Funds gain of	383,698,000
Virginia's Combined Direct and Indirect Gain	**$2,211,740,000**
including:	
Personal Income gain of	$675,011,000
Business Income gain of	1,043,483,000
State and Local Government Revenue gain of	109,548,000
Federal Government Funds gain of	383,698,000
Total Virginia Jobs Gained, directly and indirectly	24,300
Virginia Jobs Gained, directly	0

Source: Western Economic Analysis Center

Table 5

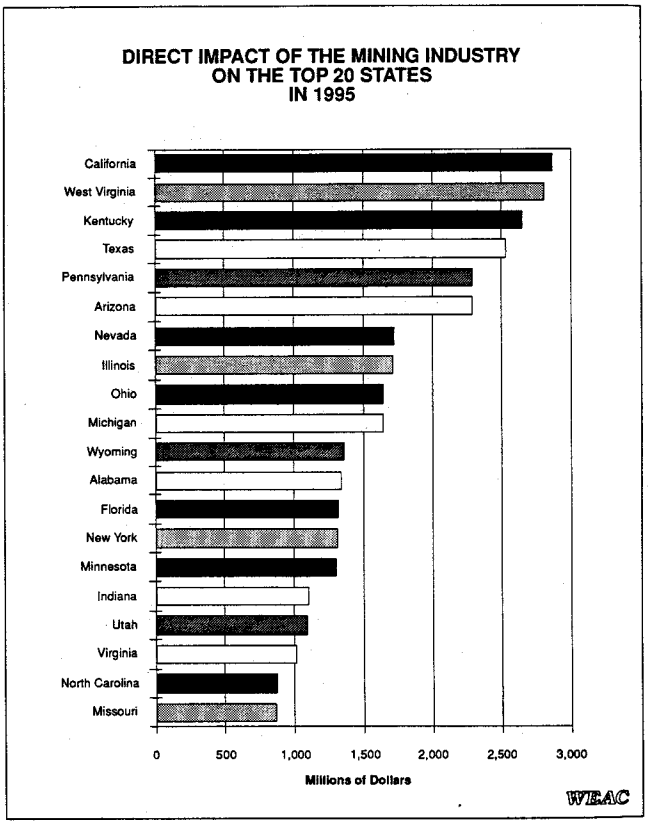

Figure 3

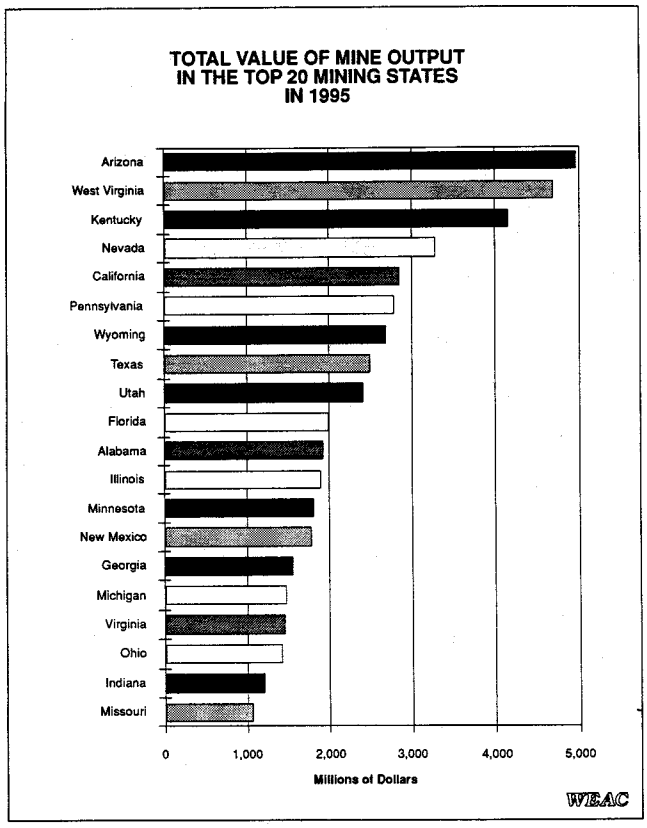

Figure 2

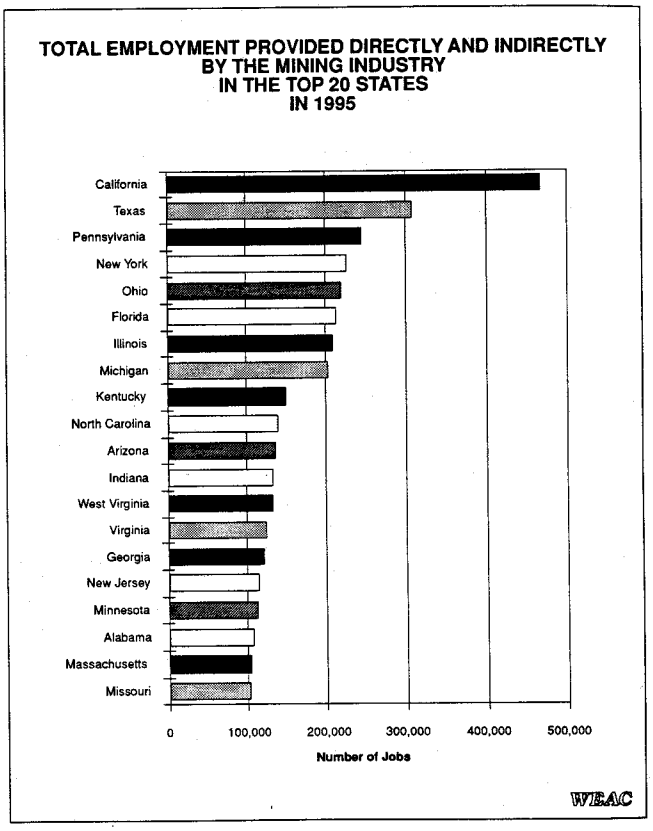

Figure 4

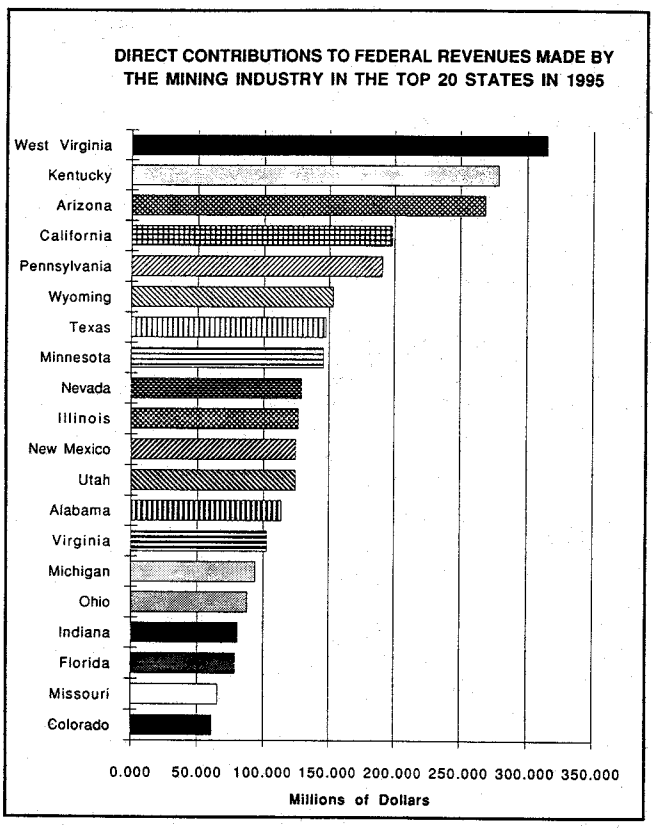

Figure 5

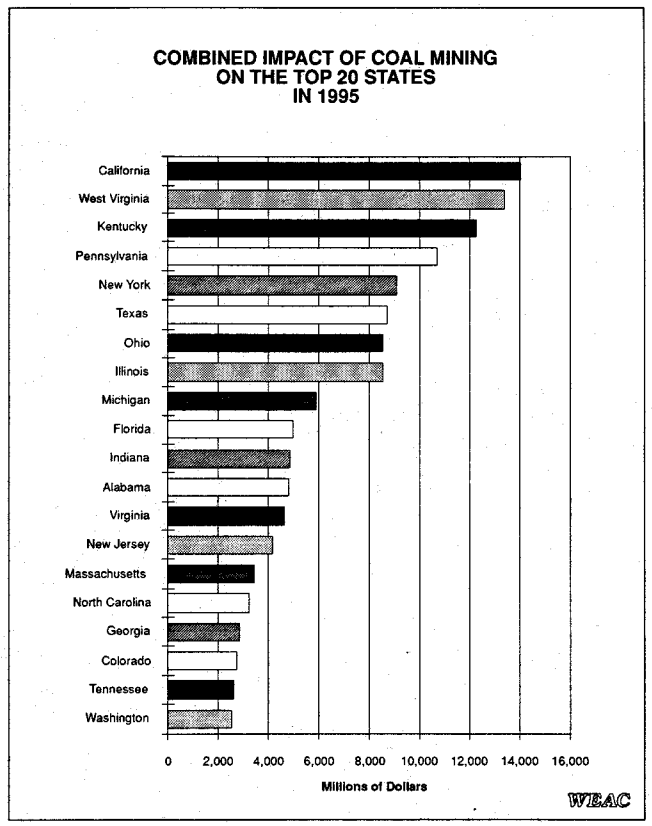

Figure 7

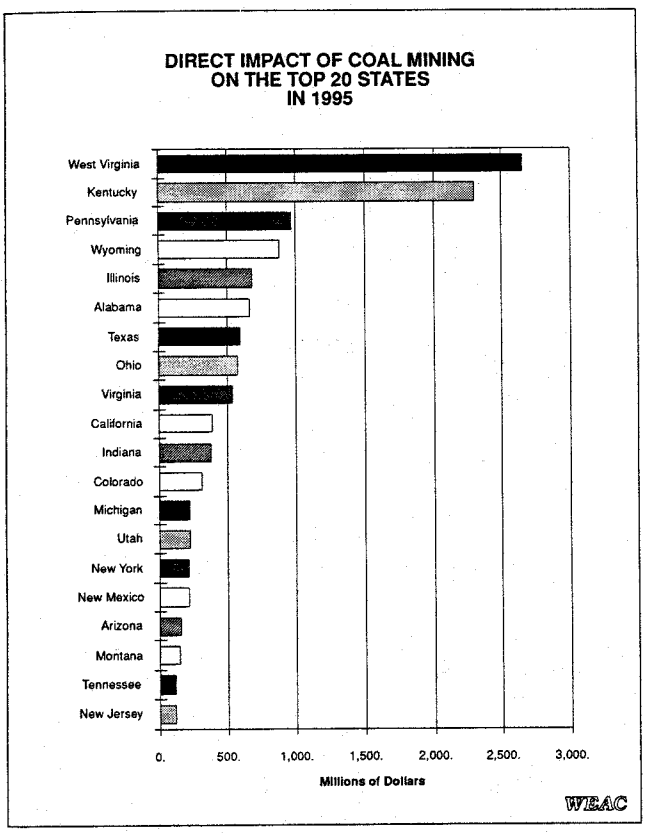

Figure 6

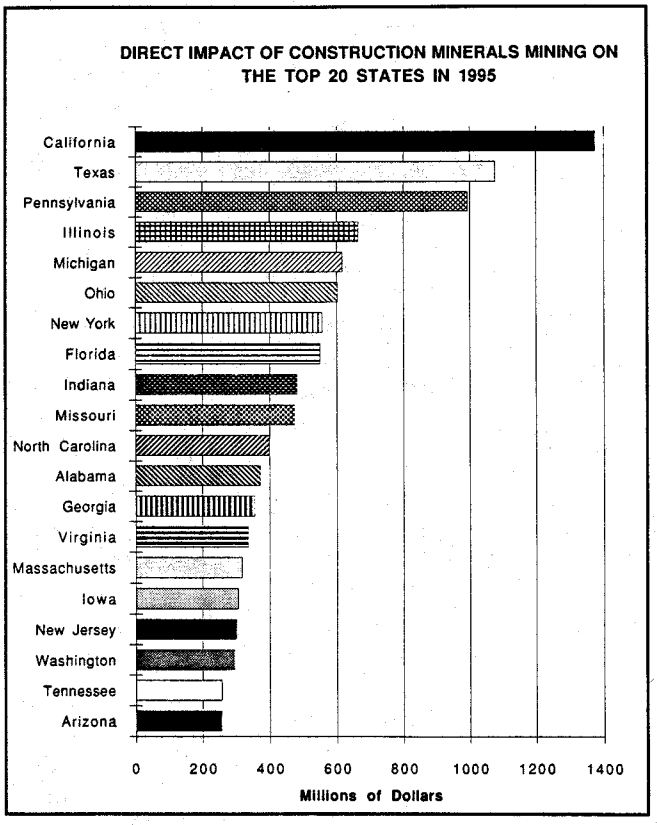

Figure 8

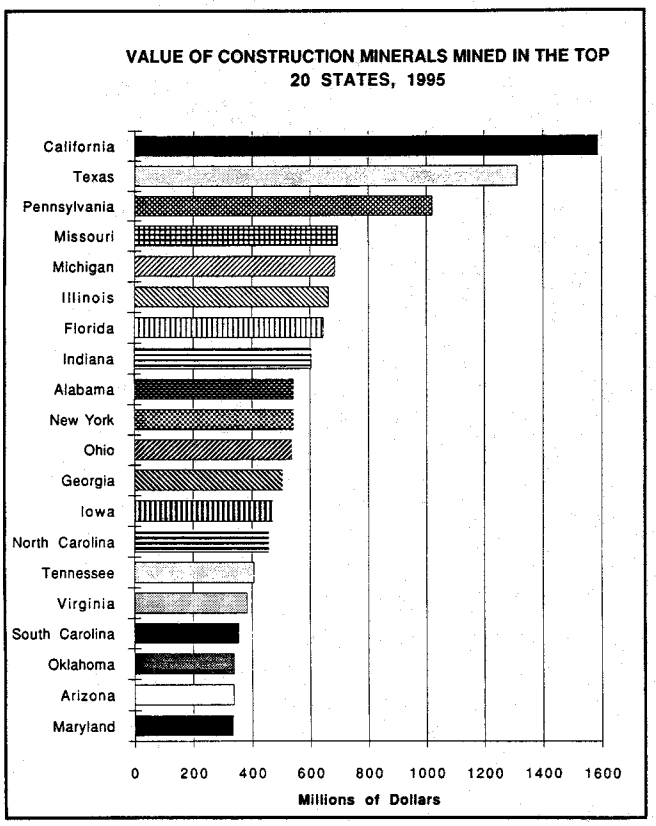

Figure 9

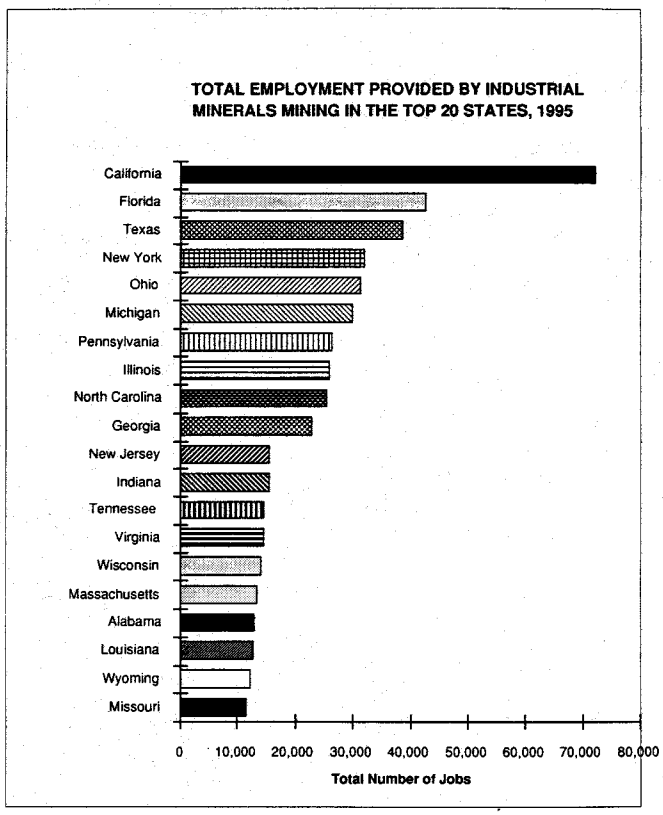

Figure 11

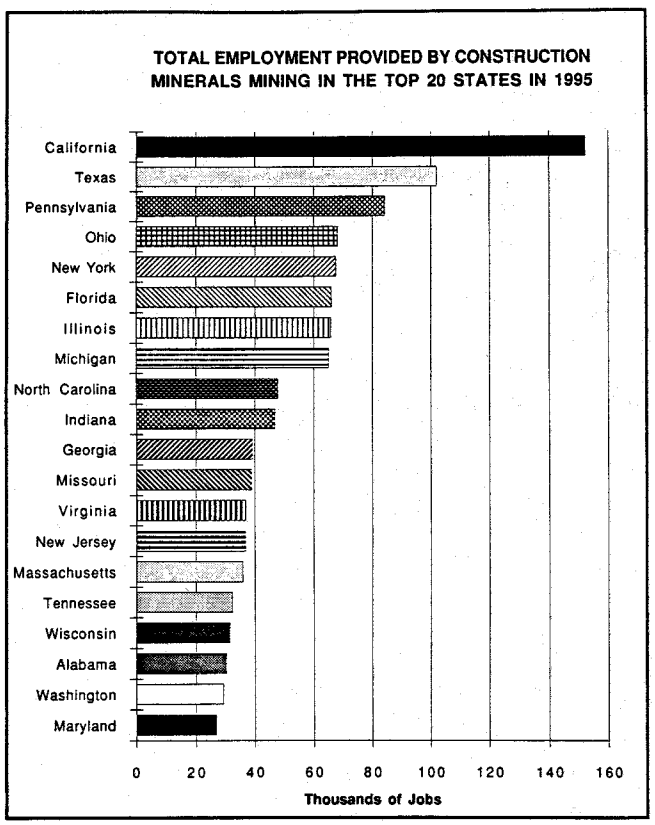

Figure 10

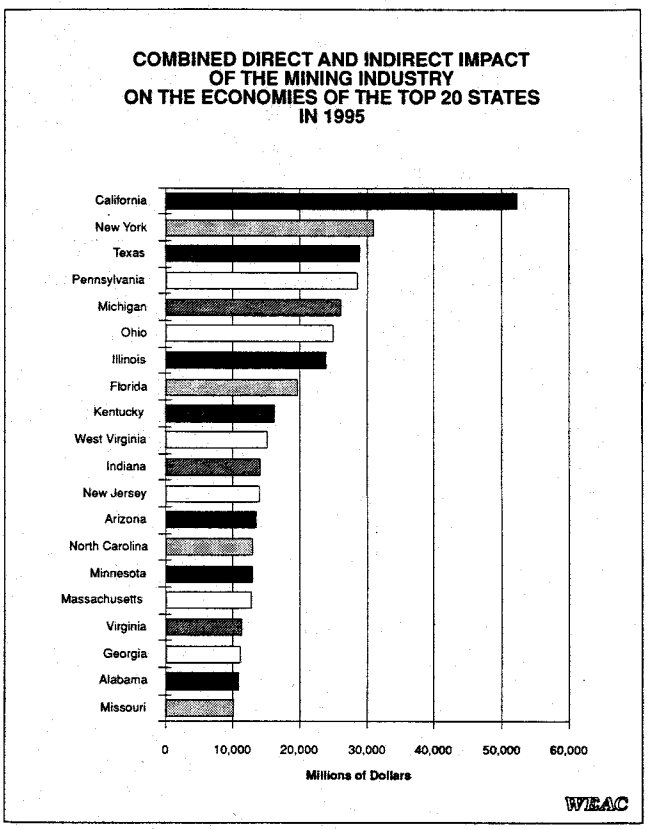

Figure 12

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NEW RELEASES

PUBLICATIONS

Publication 147: Metallic mines, prospects, and occurrences in the gold-pyrite belt of Virginia, by D. B. Spears, and M. L. Upchurch, 73 pages, 33 tables, 33 1:50,000-scale maps, 1 color 1:250,000-scale map, 1997. **Price $7.00**

Publication 148: Geologic map of the Roanoke 30 x 60 minute quadrangle, by W. S. Henika, full-color map, scale 1:100,000, with explanation, 1997. **Price: $8.00**

BROCHURES

Geology of Virginia, by R. S. Sites and D. A. Penick, 1997.

Mineral Collecting (revision), by D. A. Penick, 1997.

Virginia Diamonds (revision), by P. S. Sweet, 1997.

Oil and Gas in Virginia, by R. C. Milici and M. L. Upchurch, revised by J. E. Nolde.

Single copies of brochures are available free from the Division of Mineral Resources, P.O. Box 3667, Charlottesville, VA 22903.

NEW STAFF

David B. Spears has recently joined our permanent staff, filling a position vacated by retirement. David received a B.S. degree in Geology from Lafayette College and an M.S. degree in Geology from Virginia Polytechnic Institute and State University in 1983. His graduate research involved mapping of geologic structures and rock textures in the Shenandoah Valley. He then spent eight years as a petroleum geoogist for a major oil company in Louisianna, exploring in the Southern Appalachians and offshore in the Gulf of Mexico.

Employed as a geologist at the Division since March of 1993, he worked on the development of a coal mine data base for the Southwest Virginia coalfield. He has co-authored publications on several topics including coal, coalbed methane, and metallic resources. David's new focus will be in the computer area of digital databases.